



REMARKS/ARGUMENTS

The reconsideration of this application is respectfully requested.

Claims 1-18 remain active in this case, and stand finally rejected under 35 USC §103(a) as being unpatentable over Mori et al (6,242,825) in view of Ford (2,320,922).

Applicants respectfully traverse the outstanding ground for rejection because, in Applicants' view, the claimed invention clearly would not be obvious to a person of ordinary skill in the art, absent hindsight application of the teachings of Applicants' invention infused into the teachings of the prior art.

The insulation system of Applicants' invention corresponds to a vacuum pressure impregnating insulation system, and more particularly relates to a coil for an electric rotating machine wherein a mica tape, which includes mica flakes and cloth-like backing materials, is wound as a plurality of layers around a conductor including a plurality of Roebel-transposed square strands, and the layers of the mica tape are impregnated with an impregnating resin and then cured. Applicants' invention also relates to the mica sheet itself.

In an impregnating insulation system wherein a mica tape is wound around a conductor and then impregnated with an impregnating resin, which is one system for insulating an armature coil of a high-voltage electric rotating machine, generally, an adhesive in the mica tape has mutual dissolubility with the impregnating resin such that they can be formed integrally with each other. With the mutual dissolubility of the adhesive and impregnating resin, a main insulation layer is formed and its electrical strength (insulation performance) is maintained. This is true of the Mori et al. system. If inorganic particles are supported using only the adhesive that is mutual dissoluble with the impregnating resin, as taught by Mori et al., in order to improve the thermal conductivity of the main insulation layer, the adhesive dissolves mutually with the impregnating resin and loses its supporting function with the adhesive is impregnated with the impregnating resin. In the subsequent

pressure-molding step of the main insulation layer, therefore, thermal-conducting inorganic particles flow out of the mica tape and the main insulation layer together with the residual adhesive and the impregnating resin, and any expected advantage of improving thermal conductivity of the insulation layer cannot be obtained.

According to the present invention, the above problem is resolved by adding glue insoluble in the impregnating resin, such polyvinyl alcohol, to an adhesive for supporting the inorganic particles, such as epoxy resin. The glue insoluble in the impregnating resin increases the viscosity of the adhesive and its high-molecular chain catches the inorganic particles to prevent the inorganic particles from flowing out. Thus, according to the present invention, improvement of the thermal conductivity of the insulation layer can be obtained.

The technology disclosed by Mori et al. is described in the Background of the invention in Applicants' specification at page 7, line 14 through page 9, line 6. In the commonly-used impregnation insulation for impregnating a mica tape wound around a conductor with an impregnating resin, as above indicated, an adhesive in the mica tape has mutual dissolubility with the impregnating resin such that they can be formed integrally with each other. If, therefore, inorganic particles are supported using the adhesive, the adhesive dissolves mutually with the impregnating resin and loses its supporting function. In the subsequent pressure molding step, thermal-conductivity inorganic particles heat flow out of the mica tape layers together with the residual adhesive and the impregnating resin to thereby decrease the thermal conductivity of an insulation layer of a coil.

In particular, as is similarly disclosed at column 8, line 48-52 in the Mori et al patent, in the conventional pre-preg technique, the mica tape wound around the conductor is pressurized by a pressure jig. The residual impregnating resin including the adhesive component mutually dissoluble with the impregnating resin are squeezed from the mica tape

layers.¹ Conventionally, the inorganic particles may also flow out together with the residual impregnating resin and the adhesive. Mori et al, which at col. 8, lines 13-24 teach use of a novolak type epoxy resin impregnated with what is believed to be a soluble glue formed of BF3 mono-ethylamine, do not recognize this problem and provide no teachings to solve this problem.

If, however, there is provided in the adhesive a second glue component insoluble in the impregnating resin, as taught and claimed by Applicants, the second glue component increases the viscosity of the adhesive and its high-molecular chain catches the inorganic particles to prevent the inorganic particles from flowing out. The second function necessary for the second glue component of the adhesive is therefore to increase the viscosity of the adhesive and catch the inorganic particles to prevent them from moving. Stated differently, “the supporting effect of polyvinyl alcohol [the second glue component] prevents the flowing out of the inorganic particles 14 with impregnated resin from the insulation wall 8 even within the heat pressing is applied to form a final section.”² This second function is disclosed in neither Mori et al nor Ford. Once again, as Mori et al and Ford both teach an adhesive including only a single glue component, neither Mori et al nor Ford recognizes the problem to which Applicants’ invention is addressed, and neither suggests any solution thereto.

Of significance, the second glue component of the claimed adhesive, insoluble in the impregnating resin, need not function as an adhesive, which is certainly not taught or suggested by Ford.

Reiterating, the first component (epoxy resin) that is soluble in the impregnated resin and the impregnated resin (a composition comprising a cycloaliphatic epoxy compound, an acid anhydride curing agent, and a reactive diluent) are both resins, but different in

¹ This is specifically disclosed by Mori et al, at column 8, lines 50-51 (“...while part of the resin contained in the insulator is being ejected by applying an external force ...”

² Specification, page 13, lines 17-21, and page 17, lines 12-16.

composition. The adhesive component which is squeezed out of a coil together with an excess impregnated resin at the time of heat pressing is the first component that is soluble in the impregnated resin of a mica tape adhesive. The adhesive component which is heated and cured in a coil together with an impregnated resin after heat pressing is the first component of a mica tape adhesive, which is soluble in the impregnated resin and the second glue component of the mica tape adhesive, which is insoluble in the impregnated resin. Consequently, the adhesive component which is squeezed out of a coil together with an excess impregnated resin at the time of heat pressing is limited to the first component that is soluble in the impregnated resin.

Ford discloses using an adhesive containing a glue insoluble in insulating oil, for the purpose of gluing adjacent turns of a coil, and preventing the coil from disassembling by the adhesive dissolving in the insulating oil at the time the insulating oil is impregnated to the coil.³ The adhesive of Ford is used to bond together the turns of a coil. It is favorable that the adhesive is a thermoplastic, because a tape coated with the thermoplastic is wound around the coil, the coil is pressurized and heated, and the thermoplastic is melted and then cooled, thereby bonding the turns of the coil. After that, the coil is impregnated with an insulating oil. If the adhesive of Ford is dissolved in the insulating oil, the turns of a coil would become separated. The adhesive of Ford therefore needs to be insoluble in the impregnating insulating oil so as to avoid separation of coils.

Ford does not teach inorganic particles supported with a mica tape using an adhesive comprising a first component having mutual dissolubility with the impregnating resin and a second glue component insoluble in the impregnating resin. Thus, in the absence of inorganic particles to be preserved during heating and pressure treatment, Ford is not presented with the problem Applicants' invention addresses. As Ford teaches a single

³ This is clearly evident from Ford's Claim 1, last several lines.

insoluble component glue, and not soluble and insoluble glue components as claimed, Ford clearly cannot possible teach the solution to the problem to which Applicants' invention is addressed. In fact, it is respectfully submitted that there is no motivation provided by Ford for adding a second glue component soluble in an impregnating material to the Ford adhesive. To do so would be contrary to the Ford agenda of avoiding adhesive dissolving in the insulating oil and consequent separation of coils, and if anything, Ford teaches away from the claimed use of an adhesive having two glue components, one soluble and the other insoluble in an impregnating resin.

In fact, the reason why an adhesive insoluble in insulating oil is used in Ford, has nothing to do with why the present invention uses an adhesive containing a first glue component soluble in the impregnating resin and a second glue insoluble in impregnated resin, i.e., preventing inorganic particles, used for thermal conduction, from flowing outside the insulating layer together with the impregnated resin, and has everything to do with the task at hand in Ford which is different from that of Applicants' invention as above described. In other words, with the present invention, a soluble adhesive glue component, not the insoluble adhesive glue as taught by Ford, is used as an adhesive, and an insoluble adhesive glue component is not used as an adhesive, per se, but instead to increase the viscosity of the adhesive and to make the inorganic particles stick thereto, so that the inorganic particles can be prevented from flowing outside the insulating layer together with the impregnated resin.

Ford is emphatic in its teaching that the glue be insoluble, and does not at all suggest an adhesive which contains two glue components, one soluble in an impregnating resin and another insoluble in the impregnating resin. Mori et al., on the other hand, teaches the "so-called pre-preg insulation system using a pre-preg mica tape," described in the background section of Applicants' disclosure at page 7, lines 14 through page 8, line 27. The pre-preg insulation system, as noted at page 7, lines 22-26 of Applicants' specification requires "the

adhesive **must** be dissolved with the impregnating resin” (emphasis added) so that, as described at page 8, lines 14-18 of Applicants’ specification, “the adhesive and the impregnating resin are dissolved each other and the resin viscosity temporarily decreases at the early stage of heat curing ... [and] a part of resin including the inorganic particles flows out of the insulation layer.” This operation is essentially what is described at column 8, lines 44-54 of the Mori et al patent. So there can be no doubt that the Mori et al system is a pre-preg insulation system as described in the background section of Applicants’ disclosure.

Thus, it is seen that Ford is undeniably adamant in requiring insoluble adhesive added to a resin, and the pre-preg system as taught by Mori et al correspondingly requires a soluble adhesive impregnation. Use of a soluble adhesive component would seem antithetical to the teachings of Ford, and use of an insoluble adhesive component is antithetical to the pre-preg insulation system taught by Mori et al. Neither Ford nor Mori et al at all suggests using two adhesive glue components, soluble and insoluble, for any reason, and clearly neither teaches a pre-preg insulation system using a second adhesive insoluble glue component insoluble in impregnating resin (or insulating oil) to prevent inorganic particles, used for thermal conduction, from flowing outside the insulating layer together with the impregnated resin. Accordingly, the motivation for combining the single insoluble adhesive of Ford and the single soluble adhesive and inorganic particles feature of Mori et al., cannot be found from the descriptions in either of the references. Therefore, the outstanding rejection appears to be based on hindsight on what appears to be a finding of “obvious to try.”

In In re Vaeck 947 F.2d 488, 20 USPQ 2D 1438 (Fed. Cir 1991) the Federal Circuit noted:

“Where claimed subject matter has been rejected as obvious in view of a combination of prior art references, a proper analysis under § 103 requires, inter alia, consideration of two factors: (1) whether the prior art would have suggested to those of ordinary skill in the art that they should make the claimed composition

or device, or carry out the claimed process; and (2) whether the prior art would also have revealed that in so making or carrying out, those of ordinary skill would have a reasonable expectation of success. Ψ Both the suggestion and the reasonable expectation of success must be founded in the prior art, not in the applicant's disclosure." (Emphasis added)

See also *Merck & Co. v. Danbury Pharmacal Inc.*, 694 F. Supp. 1, 29, 8 USPQ2d 1793, 1816 (D. Del. 1988), *aff'd*, 873 F.2d 1418, 10 USPQ2d 1682 (Fed. Cir. 1989) ("the governing standard is emphatically not whether a particular method or process leading to an invention would be 'obvious to try,' Ψ but whether such an experiment would have been expected to succeed Ψ Moreover, this expectation must be measured with deliberate avoidance of hindsight assessment.")

In the present situation, it is respectfully submitted that there is no basis on the record for the finding either that there is a "suggestion" (or motivation) to combine, nor is there any basis on the record for finding that there would be a "reasonable expectation of success" founded in the prior art and not in Applicants' disclosure, to modify the soluble single glue of Mori et al to include a second insoluble glue, merely because Ford teaches use of an adhesive consisting solely of a single insoluble glue for a different application in which solubility would be harmful, with no recognition or suggestion that inorganic particles can be prevented from flowing outside the insulating layer together with the impregnated resin using a two component adhesive. **Stated differently, neither Mori et al nor Ford teaches adding a viscosity increasing component to the soluble glue taught by Mori et al so as to prevent outflow of inorganic particles.**

It is respectfully submitted that a rejection of claims must be supported by "substantial evidence" within the record,⁴ and by "clear and particular" evidence⁵ of a

⁴ *In re Gartside*, 203 F3d 1305, 53 USPQ2d 1769 (Fed. Cir. 2000) (holding that, consistent with the Administrative Procedure Act at 5 USC 706(e), the CAFC reviews the Board's decisions based on factfindings, such as 35 U.S.C. § 103(a) rejections, using the 'substantial evidence' standard because these decisions are confined to the factual record compiled by the Board.)

suggestion, teaching, or motivation to combine the teachings of different references. As discussed above, there is no substantial evidence, nor clear and particular evidence, within the record of motivation for modifying the Mori et al. single adhesive glue component teaching by incorporating the Ford's single adhesive glue component teaching to derive Applicants double adhesive glue component invention, given the disparate, unrelated, and in fact contrary teachings above noted. Without such motivation and without absent improper hindsight reconstruction,⁶ a person of ordinary skill in the art would not be motivated to perform the proposed modification, and the pending claims are believed to be non-obvious and patentable over Mori et al and Ford.

Moreover, the CCPA in In re Mercier, 185 USPQ 774 (C.C.P.A. 1975) stated that

The board's approach amounts, in substance, to nothing more than a hindsight "reconstruction" of the claimed invention by relying on isolated teachings of the prior art without considering the over-all context within which those teachings are presented. Without the benefit of appellant's disclosure, a person having ordinary skill in the art would not *know what portions of the disclosure of the reference to consider and what portions to disregard as irrelevant, or misleading*. See In re Wesslau, 53 CCPA 746, 353 F.2d 238, 147 USPQ 391 (1965). [emphasis added]

Here, without knowledge of Applicant's disclosure, one would have no reason to modify the isolated teachings of either of Mori et al or Ford, and in any event would not know what portions of the disclosure of the Mori et al and Ford references to retain and modify, and one would not know what portions to disregard as irrelevant, or misleading.

It is evident from the above that neither of Mori et al. and Ford discloses or suggests "inorganic particles supported with the mica tape using an adhesive comprising a first

⁵ In re Dembiczak, 175 F3d 994, 999, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999) ("We have noted that evidence of a suggestion, teaching, or motivation to combine may flow from the prior art references themselves, the knowledge of one of ordinary skill in the art, or, in some cases, from the nature of the problem to be solved, although <the suggestion more often comes from the teachings of the pertinent references.> The range of sources available, however, does not diminish the requirement for actual evidence. That is, the showing must be clear and particular.") (emphasis added).

⁶ See MPEP 2141, stating, as one of the tenets of patent law applying to 35 USC 103, that "[t]he references must be viewed without the benefit of impermissible hindsight vision afforded by the claimed invention."

component having mutual dissolubility with the impregnating resin and a second glue component insoluble in the impregnating resin" as recited in Applicants' amended claims. Accordingly, it is respectfully submitted that the amended claims patentably define over the cited art and that the outstanding rejection has been overcome.

Consequently, in view of the above comments, no further issues are believed to be outstanding, and the present application is believed to be in condition for formal allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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